University of Wyoming Science Initiative Building

REVOLUTIONIZING RESEARCH FACILITIES

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How the University of Wyoming's Strategic Plan Captured the Spirit of Wyoming and Illuminated the Pathway to a Tier 1 University

In 2016, the University of Wyoming (UW) approved a new strategic plan, *Breaking Through – Strategic Plan 2017–2022*. This groundbreaking plan established a goal of creating Tier 1 best-in-class programs to enable students to receive excellence in science education and researchers to conduct world-class research.

The strategic plan established three key initiatives with the intention of supporting the state's industries and natural assets, including mineral extraction, agriculture, emerging technology, tourism, and resource management, as well as protecting the unique environment of Wyoming. The three initiatives are:

- Education
- Science
- Engineering

The university took the following key points into consideration when establishing the new strategic plan:

- Create a built environment that influences student recruitment
- Create the ability to research differently through multidisciplinary collaboration
- Establish a campus infrastructure that supports development ambitions
- Incorporate sustainability and outside-the-box thinking

The Science Initiative is an essential connective tissue across all three UW initiatives and acts as a gateway to all the university's STEM learning. An essential element of the Science Initiative was building a world-class facility to support learning and research. Completed in 2022, the Science Initiative Building gives students and researchers access to one of the most technologically advanced facilities in the nation.

The 153,000-square-foot, five-level facility is home to:

- Modern laboratory research space for faculty and students.
- State-of-the-art greenhouse and plant growth areas.
- The Model Organism Research Facility.
- The Center for Advanced Scientific Instrumentation.
- Active-learning classrooms.
- Collaborative spaces for undergraduate and graduate education and research.

Source: Breaking Through: University of Wyoming Strategic Plan 2017-2022

University of Wyoming - Science Initiative Building

A built environment that influences student recruitment

UW's Science and Engineering Initiative program was created to elevate the university to national prominence in undergraduate education and select areas of research and enhancement of economic development for the State of Wyoming.

During the programming phase of the new Science Initiative Building, UW's core principles guided the process. The initiative program's core focuses are on the following strategic goals:

- Excellence in undergraduate education.
- World-class research and graduate programs.
- Productive economic development.
- K-14 STEM education.

The Science and Engineering Initiative program (Tier 1 Engineering Initiative) will complete Phase 3 in 2025 and anticipates having completed the following goals:

- Increase undergraduate enrollments from 1,400 to 2,200.
- Increase graduate enrollment to 560.
- Double the number of financial awards and scholarships.
- Establish research centers of excellence in at least six critical areas of engineering and applied science.
- Consistent with creating economic impact to the state.

> "The Science Initiative Building is a new place where students can work directly in a cutting-edge facility, laboratories and experience hands-on, active learning with hundreds of their peers..."
>
> -Ed Seidel, UW President

57%

Undergraduate enrollment growth following investment into new research education facilities.

UW- Science Initiative Building

Research differently – multidisciplinary collaboration

Previously, departments housed in the Science Initiative Building were separate and housed in various buildings across the university's campus. Bringing departments into closer proximity was a guiding principle for UW's building programming.

The new Science Initiative Building enables researchers to share resources under one roof and allows various departments to research differently and collaboratively.

National Science Foundation's (NSF) Established Program to Stimulate Competitive Research (EPSCoR), allowed UW to combine various disciplines that were previously scattered across the university's campus. UW was able to combine soil microbiology, biogeochemistry, genomics, computational biology, and data science under one roof. This allowed UW to increase daily *unplanned collisions*, leading to new scientific outcomes.

"The physical space will lead to collaborations that aren't likely to happen otherwise"

-Greg Brown,
UW Botany Professor and Executive Operations Director

The Science Initiative Building also enabled UW to create two new transformative research centers: CASI (Center for Advanced Scientific Instrumentation) and CIBR (Center for Integrative Biological Research).

CASI co-locates imaging scientists and student teams, who are focused on next-generation technologies at the state and national levels, into one integrated research space.

CIBR allows for collaboration and innovation, with a focus on environmental and health-related challenges. The center is focused on plant growth and laboratory animal research facilities, using both model and transgenic organisms.

UW Science Initiative - Roof Level Greenhouses

"It's all about learning and evoking UW's mission of integrating education and research. The core of the mission for the building is all about learning – and this is best achieved in the highest priority spaces of the laboratories and active-learning research labs/ classrooms. The facility is thought of as a marquee that helps demonstrate that education in technical development actually drives technological development in Wyoming and works mutually to drive science to an ever-higher level."

-Guiding Principle #1,
Science Initiative Task Force

The UW Science Initiative Building continues the transformation on campus within the core sciences and brings the CASI, core facilities within the CIBR, and Active Learning Classrooms (ALC) together into an interdisciplinary modern facility for faculty and students.

The new Science Initiative Building is a five-story structure, including a concrete foundation and structural steel frame with a composite concrete floor system. Exterior walls consist of steel studs, insulation, and stone masonry veneer, interlaced with a curtainwall glazing system. The mechanical, plumbing, and electrical (MEP) systems are state of the art, including three large energy recovery units. The building also includes specialized audio visual and IT systems to allow the users to share their research work in real time.

The CASI consists of state-of-the-art imaging rooms for atomic force microscopes, transition electron microscopes, and X-ray photo electron spectrometer, which are essential to support their nanomolecular materials research.

A campus infrastructure supporting development ambitions

UW - West Satellite Energy Plant

The QR code (below) shows a video that tells the story of the central utility plant (CUP) with all strategic partners engaged in the planning and execution of the project. This modular-style boiler plant is scalable, allowing to double output capacity based on future development needs for the campus. Additionally, this project allowed the university to eliminate coal/steam for hot water, effectively eliminating the need for the 100-year-old concrete tunnels to channel hot steam from the plant to buildings for heat.

Check out a video on the UW CUP Project and how it's allowed for campus expansion

When a university is considering a revamp or update to their strategic plan, it is imperative they take infrastructure and utilities into consideration. Today's buildings, especially highly technical science buildings such as the Science Initiative Building, often require significant upgrades to campus infrastructure to perform to today's standards and beyond.

The Science Initiative Building created challenges to the existing University of Wyoming campus infrastructure. UW's aging steam utility plant, with its vast concrete tunnel system, was over 100-years-old and located off-site. Knowing that their costly and ineffective existing infrastructure would lead to increased utility costs, challenges in maintenance, trouble ensuring consistent access to heat, and unscalable existing systems made it imperative that infrastructure updates take place in concert with construction of the Science Initiative Building. It also supported the university's goal of creating a more energy efficient and sustainable campus.

As a result, the CUP was relocated on campus as part of the overall creation of the Science Initiative Building. The CUP created its own unique challenges for the design team as there were significant MEP constraints. In addition, they were challenged with designing a plant that was aesthetically pleasing and met campus design guidelines and standards. To meet the challenge, the design team utilized the university's exterior stone and incorporated high bay windows in the CUP's design.

UW - Science Initiative Building - lab space

Incorporate sustainability and outside-the-box thinking

Complexity and timing were essential design drivers for the Science Initiative Building, which was required to meet LEED Silver standards. Due to the substantial amount of lab space in the building and its accompanying exhaust requirements, the Science Initiative Building does not recirculate a substantial amount of indoor air. Typically, recirculation captures energy and provides recirculation savings for heating/cooling. As this was not the case for the Science Initiative Building, the design and construction team had to think outside the box to find a system that would provide sufficient energy recapture to meet the project's sustainability goals.

The solution was to use a Konvekta Energy Recovery System which captures 100% of the building heating/cooling exhaust and then transfers that energy back into the system. The result is an 85% efficiency guarantee in energy savings. The Konvekta Energy Recovery System comes from Switzerland and required a significant lead time for procurement and shipping. The project team identified this element of design early as part of the building's critical path and was able to order early to ensure delivery prior to commissioning and inspections.

One unforeseen benefit of the building system exhausting 100% of the indoor air was that it provided a significant safeguard against the spread of COVID-19 and future viruses. While this benefit was unintended in design, the practice of exhausting 100% of indoor air is now being considered for all future development UW projects, where applicable.

For UW, all sustainability discussions come from a campus maintenance and facility lens, yet sustainability planning has become a benefit in the university's goals around student attraction and retention. The strong sustainability commitment allows for efficient energy consumption, protection against COVID-19 and potential future pandemics, is less expense for capital utility costs, and allows UW to deliver the best possible buildings to support departments while ensuring appeal and functionality in the built environment for students and faculty now and in the future.

UW Science Initiative - Roof level 12 separate greenhouses totaling 6,400 square feet & two walk-in growth chambers

UW Science Initiate - Roof level greenhouse windows

BUILDING FEATURE	A CLOSER LOOK			
	Student recruitment	Multidisciplinary collaboration	Infrastructure	Sustainability
Neighborhood Concept	●	●		
Interdisciplinary Research	●	●		
Animal Care Facility – Animal Nutrition, Reproductive Biology, Livestock Production Systems & Meat Science & Food Technology	●	●		
CIBR Lab, Office & Lab Support – Center For Integrative Biological Research	●	●		
Open Labs Surrounded by Fume Hood	●	●		●
Cold Rooms & Equipment Areas	●	●		
Tissue Culture Rooms	●	●		
Flex Labs And Bsl2 Labs To Support Greenhouse Applications	●	●		●
Autoclave	●	●		
Chemical Storage	●	●		
Glass Wash	●	●		
Waste Storage	●	●		
Radioactive Room	●	●		
Roof Level 12 Separate Greenhouses Totaling 6,400 SF & Two Walk-In Growth Chambers	●	●	●	●
Cleanrooms	●	●		●
Vivarium	●	●		
Designed to Leed Silver	●	●		●
State of The Art Imaging Rooms For Atomic Force Microscopes	●	●		
Transition Electron Microscopes	●	●		
X-Ray Photoelectron Spectrometer	●	●		

UW - Science Initiative Building - lab space

GE Johnson loves building facilities for the future generations knowing that those spaces create experiences which will shape the learning culture of generations to come.

- Jim Johnson, President and CEO of GE Johnson

CLIENT:

University of Wyoming

TEAM:

- GE Johnson Construction Wyoming - Contractor
- Perkins & Will - Design Architect
- GSG Architects - Executive Architect

THREE TAKEAWAYS FOR SUCCESS:

- Design for future expansion and flexibility – Leave room to grow in the form of shelled space for expanded and new programs as funding becomes available.
- Create spaces for "unintended collisions" – Place different disciplines in proximity of one another and create spaces for common interaction to provide opportunities for collaboration that may not otherwise occur.
- Consider infrastructure - Understand the energy and water needs of new facilities as part of expansion plans to ensure future scalability and sustainability.

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